

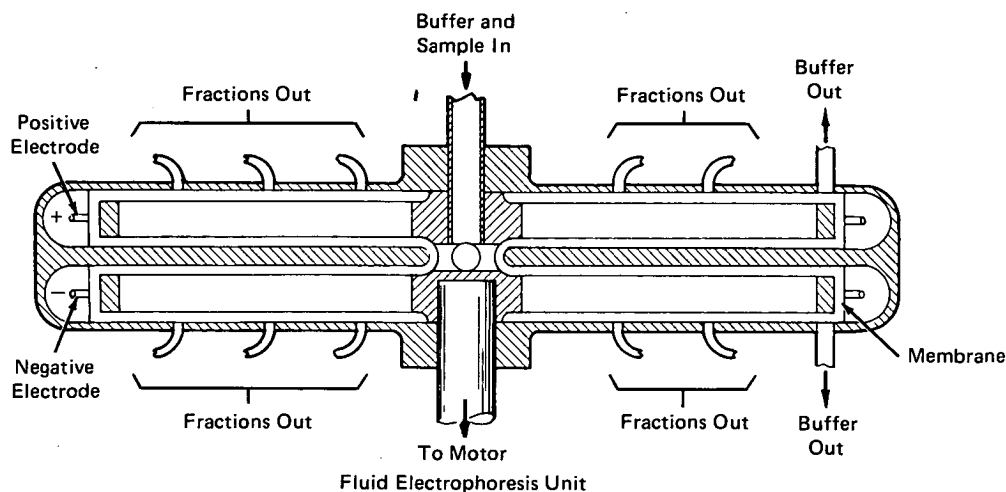
NASA TECH BRIEF

Marshall Space Flight Center



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Electrophoresis Separator Combining Centrifugal Separation



Electrophoresis is a widely used technique for separating mixtures. In general, however, the method has not been useful for separating more than small quantities for laboratory use. A new analytical separator, that is both an electrophoresis cell and a centrifuge, can handle mixtures in industrial quantities.

This apparatus is shown in the illustration. It consists of a pair of impellers on a rotating shaft. Both are electrophoresis cells: one with positive poles, one with negative poles. Electrolyte buffer and sample are introduced through a port on the axis of the device. The sample, containing charged particles, divides upon entering the system, and the particles begin to migrate outward toward the pole of opposite charge.

The buffer solution is chosen to be denser than the particles. Thus, the centrifugal force causes the buffer to move outward and the particles to move inward. By proper choice of the electrophoresis potential and the velocity of rotation, the electrophoresis force can be made to equal the centrifugal force. In this way, particles with the same charge-to-mass ratio will congregate in zones at a definite distance from the axis.

Once the particles have reached the stable zone, they will tend to stay there even though perturbed by outside

forces. Should a particle move to a greater radius, increased centrifugal force and decreased electrical force cause it to move back. The opposite occurs, should the particle be perturbed to a lesser radius. This system, then, tends not to be affected by convection and other disturbances that are so troublesome in conventional electrophoresis systems.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Marshall Space Flight Center
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NASA has decided not to apply for a patent.

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